NEWS & VIEWS

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Dr. C.S. (Cliff) Snyder, Midsouth Director
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Precision Agriculture Progress in the Midsouth

SITE-SPECIFIC crop management, including intensive soil sampling and precision fertilization, is gaining ground in the Midsouth. Prior to 1990, in the U.S., it was estimated that less than 100,000 acres were intensively soil sampled or yield monitored. Now, an estimated 4 to 5 million acres have been intensively soil sampled and/or yield monitored. As of January 1, 1997, there were 100,000 to 500,000 acres receiving variable rate lime and/or nutrient applications in 13 Midsouth and Southeastern states.

PPI conducted a phone survey of leading fertilizers dealers, agrichemical businesses, and agricultural consultants in the fall of 1997 to identify the Midsouth progress in intensive soil sampling (2. 5 acres/sample or less) and variable rate lime and/or fertilizer applications. **Table 1** illustrates the results of the survey and the progress made in each state.

Historically, states with large corn and soybean acreages have led in the adoption of precision tools for nutrient management. However, variable rate fertilizer and lime applications, soil sampling, and field mapping have been increasing slowly, but steadily, farther south.

Table 1. Estimated intensive soil sampling and variable rate lime and fertilizer application in the Midsouth at the end of 1997.

State	Intensively sampled acres	Acres receiving variable rate application	Number of V.R. applicators	
			Lime	Fertilizer/ lime
Arkansas	94,500	47,000	8	12
Kentucky	147,400	56,450	—	6
Louisiana	28,000	10,500	2	3
Mississippi	32,000	14,000	3	6
Missouri	210,000	90,200	4	23
Tennessee	69,000	35,500	5	11
TOTAL	**581,000**	**253,650**	**22**	**61**

Many farmers are purchasing grain yield monitors or new combines equipped with grain yield monitors. Reports indicate there may be more than 170,000 grain yield monitors in the U.S. The number of monitors in the six Midsouth states is not known at the present time. Midsouth growers and their farm advisers have successfully collected yield data and generated maps for corn, soybeans, wheat and rice. Errors in estimating grain yields are reportedly below three percent with proper calibration. Successful yield data collection in rice fields has not proven to be as significant a challenge as previously imagined.

Research has been conducted by the University of Georgia and Mississippi State University on the performance of two **cotton yield monitors**, Micro-Trak Systems and Zycom Corporation. Initial testing has identified some opportunities for improvement before large-scale commercial release to growers. Yet, the optical sensor-based monitors look quite promising with further refinement. One company hopes to have a moisture sensor option available with the yield monitoring system, which may further improve accuracy and precision of cotton yield monitoring.

Scientists at several universities in the Midsouth are investigating components of site specific management and newer technologies. Some examples follow.

- The **University of Missouri** is working with the **USDA/ARS** to evaluate the potential use of electromagnetic induction (EM) sensor measurements in determining subsurface soil variability and its effect on productivity and fertility. This work has been extended to the Bootheel of Missouri with partial support from PPI and the Foundation for Agronomic Research (FAR).

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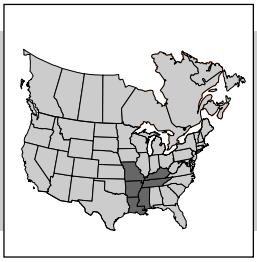

- The **University of Tennessee** is evaluating soil chemical and physical variability (partially supported by PPI and FAR), variable rate fertilizer and weed control technologies, on-the-go or real-time crop nitrogen (N) and potassium (K) nutrition sensing, and cotton yield monitors.

- The **University of Kentucky** has conducted research with variable corn populations based on soil depth and productivity. Scientists there are also exploring variable rate weed control technologies.

- **Mississippi State University** has initiated a sizable interdisciplinary project led by agricultural economists. Scientists are studying how soil fertility variability relates to yield.

- The goal of scientists at the **University of Arkansas** (with partial support from PPI and FAR) is to enhance understanding of soil variability, expose ways to improve crop yields and nutrient management, and to improve farmer and fertilizer industry profitability. They are identifying areas in fields with low, medium, and high soil test P and K to evaluate soybean responses to P and K fertilization. Responses by rice and wheat are also being explored.

- **Louisiana State University** is conducting studies on soil fertility variability and the soybean yield response to variable rate fertilizer applications. Uniform applications of fertilizer, based on the field average recommendation, are being compared with variable rate fertilizer applications based on soil tests from either 2.5 or 1.0-acre soil sampling grids.

The demand for precision soil sampling and nutrient application services is typically grower-driven. As more farmers start using yield monitors, demand may increase for precision services from consultants and fertilizer and ag chemical dealerships. As the results of precision agriculture studies become available, PPI will be involved in transferring the practical results to the fertilizer industry, consultants, farmers, and other members of the agricultural community. Certainly as more data are collected, more questions are being generated. To date, it appears that soil drainage or soil moisture holding characteristics are significant factors affecting crop growth and yield variability in much of the region. Soil pH variability is being more accurately identified with grid sampling and yield monitoring. Variable rate lime application is an area providing opportunities for many fertilizer/lime dealers.

Fertilizer dealers and growers, who are among the first to consider precision ag, are learning that crop yield variability is often not well related to soil test P and K. This does not dismiss the possibility that variable rate fertilization may be profitable, in the short-term or the long-term. Instead, it helps to better focus our attention on the other factors influencing yield … factors which are and are not under management control. “Hidden” soil-borne pest problems such as nematodes, diseases and insects have not received as much attention as the more easily controlled production factors, but will also need to be considered in precision programs.

Much research remains to be conducted in the Midsouth to address the economics of precision farming approaches …because there are many possible approaches. Conceptually, site-specific management makes good farming sense, with the placement of inputs where the greatest likelihood of an economic return exists. We now have the tools to begin moving away from field average management and to document, within a 3-foot accuracy, changes in resources and management that affect yields in most of our fields. More intensive management, using precision agriculture tools, affords many a way to reduce risks and to raise the potential for improved profits.

Acknowledgement. We thank those fertilizer dealers, agrichemical suppliers, and agricultural consultants who kindly responded to our phone calls, allowing us to assemble a rough assessment of precision technology adoption in the six-state Midsouth region. ■

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